PATENT

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Applicant:	Peter Willimowski et al.
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Title:	GAS CONTROL AND OPERATION METHOD OF A FUEL CELL SYSTEM FOR WATER AND GAS DISTRIBUTION
Attorney Docket:	8540G-000160 (GP-302781)

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APPEAL BRIEF UNDER 37 C.F.R. 41.37
AND REQUEST FOR EXTENSION OF TIME

Sir:

This is an Appeal Brief in support of an Appeal from the October 2, 2007 Final Rejection of claims 1-10 and 34 and the subsequent Advisory Action mailed February 29, 2008, rejecting claims 1 and 5-10. This Appeal Brief is being filed along with a request for a one-month extension of time pursuant to 37 CFR § 1.136, thereby extending the due date of this Appeal Brief in accordance with 37 C.F.R. § 41.37.

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Real Party in Interest

The real party in interest is General Motors Corporation, a Michigan corporation, to which the inventors, Peter Willimowski and Robert Schafer, assigned all rights in this invention. The assignment is recorded at the U.S. Patent and Trademark Office on Reel/Frame No. 014253/0155.

Related Appeals and Interferences

To the best of Appellants' knowledge, no other appeals or interferences are pending which will directly affect or be directly affected by or have a bearing on the Board's decision in the present pending appeal.

Status of Claims

All of the pending claims, 1-10 and 34, stand finally rejected. Claims 2-4 and 34 are asserted by the Examiner as being withdrawn, however, this assertion is challenged herein. Claims 11-33 stand cancelled. This appeal is taken as to all of the pending claims.

Status of Amendments

On February 4, 2008, Appellants filed an Amendment After Final in response to the final rejection mailed on October 2, 2007. Pursuant to the Advisory Action mailed on February 29, 2008, this Amendment After Final was entered for purposes of Appeal.

Summary of Claimed Subject Matter

1. A fuel cell system **(ref. nos. 20, 20′, 20″, page 6, lines 1-2 of paragraph [0016], page 9, lines 2-4 of paragraph [0021], page 26, lines 1-3 of paragraph [0045], Figs. 1, 2, and 5)** comprising:

at least one cathode section **(ref. nos. 26, 28, 64, page 6, lines 5-8 of paragraph [0016], page 9, lines 7-9 of paragraph 21, and Figures 1, 2, and 5)** having an inlet **(no ref. no., but shown in Figures 1, 2, and 5)** and an outlet **(no ref. no., but shown in Figures 1, 2, and 5)**;

at least two anode sections **(ref. nos. 30, 32, 30′, 32′, page 6, lines 8-10 of paragraph [0016], page 9, lines 4-7 of paragraph 21, Figures 1, 2, and 5)** each having an inlet **(ref. nos. 33, 36, 33′, 36′, page 6, lines 10-15 of paragraph [0016], page 9, lines 1-3 of paragraph [0022], Figures 1, 2, and 5)** and an outlet **(ref. nos. 34, 37, 34′, 37′, page 6, lines 10-15 of paragraph [0016], page 9, lines 1-3 of paragraph [0022], Figures 1, 2, and 5)**;

wherein said at least one cathode section and said at least two anode sections are operable to convert an oxidant-containing cathode reactant **(identified as oxidant in Figures 1, 2, and 5)** and a hydrogen-containing anode reactant **(identified as fuel in Figures 1, 2, and 5)** into electricity **(page 6, lines 15-17 of paragraph [0016])**, a cathode effluent **(page 6, lines 15-17 of paragraph [0016] and Figures 1, 2, and 5)** and an anode effluent **(page 6, lines 15-17 of paragraph [0016] and Figures 1, 2, and 5)**;

a first flow path **(ref. nos. 44, 44′, page 7, lines 5-8 of paragraph [0018], page 9, lines 5-8 of paragraph [0022], Figures 1, 2, and 5)** operable to supply a first anode reactant feed stream **(ref. nos. 40, 40′, page 7, lines 5-8 of paragraph [0018], page 9, lines 5-8 of paragraph [0022], Figures 1, 2, and 5)** to an inlet **(ref. nos. 33, 33′, page 6, lines 10-12 of paragraph [0016], page 9, lines 1-2 of paragraph [0022], Figures 1, 2, and 5)** of a first anode section **(ref. nos. 30, 30′, page 6, lines 8-10 of paragraph [0016], page 9, lines 4-7 of paragraph 21, Figures 1, 2, and 5)** of said at least two anode sections, said first anode reactant feed stream being the only anode reactant feed stream flowing into said first anode section through said first inlet **(ref. nos. 33, 33′, page 6, lines 10-12 of paragraph [0016], page 9, lines 1-2 of paragraph [0022], Figures 1, 2, and 5)**;

a second flow path **(ref. nos. 46, 46′, page 7, lines 5-8 of paragraph [0018], page 9, lines 5-8 of paragraph [0022], Figures 1, 2, and 5)** distinct and separate from said first flow path and operable to supply a second anode reactant feed stream **(ref. nos. 42, 42′, page 7, lines 5-8 of paragraph [0018], page 9, lines 5-8 of paragraph [0022], Figures 1, 2, and 5)** distinct and separate from said first anode reactant feed stream to an inlet **(ref. nos. 36, 36′, page 6, lines 12-15 of paragraph [0016], page 9, lines 2-3 of paragraph [0022], Figures 1, 2, and 5)** of a second anode section of said at least two anode sections, said second anode reactant feed stream being the only anode reactant feed stream flowing into said second anode section through said second inlet;

a first device **(ref. nos. 48, 48′, page 7, lines 9-10 of paragraph [0018], page 9, lines 5-8 of paragraph [0022], Figures 1, 2, and 5)** in said first flow path

operable to modulate an entire flow of said first anode reactant feed stream through said first flow path;

a second device **(ref. nos. 50, 50′, page 7, lines 9-10 of paragraph [0018], page 9, lines 5-8 of paragraph [0022], Figures 1, 2, and 5)** in said second flow path operable to modulate an entire flow of said second anode reactant feed stream through said second flow path;

a third flow path **(ref. nos. 52, 52′, page 8, lines 1-2 of paragraph 19, page 9, line 8 – page 10, line 1 of paragraph [0022], Figures 1, 2, and 5)** connecting an outlet **(ref. nos. 34, 34′, page 8, lines 1-2 of paragraph 19, page 9, lines 8-9 of paragraph [0022], Figures 1, 2, and 5)** of said first anode section to an outlet **(ref. nos. 37, 37′, page 8, lines 1-2 of paragraph 19, page 9, lines 8-9 of paragraph [0022], Figures 1, 2, and 5)** of said second anode section without passing through an anode section, said third flow path thereby providing flow communication between said first and second anode sections **(ref. nos. 30, 32, 30′, 32′, page 8, lines 2-5 of paragraph 19, page 9, line 8 – page 10, line 1 of paragraph [0022], Figures 1, 2, and 5)** through said outlets; and

a valve **(ref. nos. 54, 54′, page 8, lines 5-7 of paragraph 19, page 10, lines 1-2 of paragraph [0022], Figures 1, 2, and 5)** communicating with said third flow path and operable to modulate venting of anode effluent from said third flow path, said valve not impeding flow communication between said outlets of said first and second anode sections through said third flow path regardless of an operational state of said valve.

2. A fuel cell system **(ref. no. 20", page 26, lines 1-3 of paragraph [0045], Fig. 5)** comprising:

at least one cathode section **(ref. nos. 26, 28, page 6, lines 5-8 of paragraph [0016], and Figure 5)** having an inlet **(no ref. no., but shown in Figure 5)** and an outlet **(no ref. no., but shown in Figure 5)**;

at least two anode sections **(ref. nos. 30, 32, page 6, lines 8-10 of paragraph [0016], Figure 5)** each having an inlet **(ref. nos. 33, 36, page 6, lines 10-15 of paragraph [0016], Figure 5)** and an outlet **(ref. nos. 34, 37, page 6, lines 10-15 of paragraph [0016], Figure 5)**;

wherein said at least one cathode section and said at least two anode sections are operable to convert an oxidant-containing cathode reactant **(identified as oxidant in Figure 5)** and a hydrogen-containing anode reactant **(identified as fuel in Figure 5)** into electricity **(page 6, lines 15-17 of paragraph [0016])**, a cathode effluent **(page 6, lines 15-17 of paragraph [0016] and Figure 5)** and an anode effluent **(page 6, lines 15-17 of paragraph [0016] and Figure 5)**;

a first flow path **(ref. no. 44, page 7, lines 5-8 of paragraph [0018], Figure 5)** operable to supply a first anode reactant feed stream **(ref. no. 40, page 7, lines 5-8 of paragraph [0018], Figure 5)** to an inlet **(ref. no. 33, page 6, lines 10-12 of paragraph [0016], Figure 5)** of a first anode section **(ref. no. 30, page 6, lines 8-10 of paragraph [0016], Figure 5)** of said at least two anode sections;

a second flow path **(ref. no. 33, page 6, lines 10-12 of paragraph [0016], Figure 5)** operable to supply a second anode reactant feed stream **(ref. no. 42, page 7, lines 5-8 of paragraph [0018], Figure 5)** to an inlet **(ref. no. 36, page 6, lines 12-15 of**

paragraph [0016], Figure 5) of a second anode section of said at least two anode sections;

a first device **(ref. no. 48, page 7, lines 9-10 of paragraph [0018], Figure 5)** in said first flow path operable to modulate flow through said first flow path;

a second device **(ref. no. 50, page 7, lines 9-10 of paragraph [0018], Figure 5)** in said second flow path operable to modulate flow through said second flow path;

a third flow path **(ref. no. 52, page 8, lines 1-2 of paragraph [0019], Figure 5)** connecting an outlet **(ref. no. 34, page 8, lines 1-2 of paragraph [0019], Figure 5)** of said first anode section to an outlet **(ref. no. 37, page 8, lines 1-2 of paragraph [0019], Figure 5)** of said second anode section without passing through an anode section, said third flow path thereby providing flow communication between said first and second anode sections **(ref. nos. 30, 32, page 8, lines 2-5 of paragraph [0019], Figure 5)** through said outlets;

a valve **(ref. no. 54, page 8, lines 5-7 of paragraph [0019], Figure 5)** communicating with said third flow path and operable to modulate venting of anode effluent from said third flow path;

a fourth flow path **(ref. no. 100, page 26, lines 1-5 of paragraph [0045], Figure 5)** operable to supply a third anode reactant feed stream **(ref. no. 104, page 26, lines 1-5 of paragraph [0045], Figure 5)** to said third flow path without said third anode reactant feed stream flowing through an anode section prior to reaching said third flow path; and

a third device **(ref. no. 102, page 26, lines 1-5 of paragraph [0045], Figure 5)** in said fourth flow path operable to modulate flow through said fourth flow path.

3. The system of claim 2, wherein said third device is a proportional valve that regulates a quantity of said third anode feed stream flowing to said third flow path.

4. The system of claim 2, wherein said third device is operable to block flow through said fourth flow path.

5. The system of claim 1, wherein said first and second devices are proportional valves that regulate a quantity of said anode feed streams flowing to said respective first and second anode sections.

6. The system of claim 1, wherein said first and second devices are each operable to block flow through said respective first and second flow paths.

7. The system of claim 1, wherein said valve is a proportional valve that regulates a quantity of anode effluent vented from said third flow path.

8. The system of claim 1, wherein said valve is operable to block venting of anode effluent from said third flow path.

9. The system of claim 1, wherein said at least one cathode section is a cathode portion of a single fuel cell stack and said at least two anode sections are an anode portion of said single fuel cell stack.

10. The system of claim 1, wherein said first anode section is an anode portion of a first fuel cell stack and said second anode section is an anode portion of a second fuel cell stack.

34. The fuel cell system of claim 2, wherein said valve does not impede flow communication between said outlets of said first and second anode sections through said third flow path regardless of an operational state of said valve.

Grounds of Rejection to be Reviewed on Appeal

Claims 2-5 and 34 are alleged to be directed to an invention that is independent or distinct from the invention originally claimed.

Claims 1 and 5-10 stand rejected under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellants regard as the invention.

Claims 1 and 5-9 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Cheron (U.S. Patent No. 4,242,731).

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being obvious by Cheron.

Arguments

I. Claims 2-5 and 34 should not be withdrawn because claim 2-5 and 34 are not directed to an invention that is independent or distinct from the invention originally claimed.

A. The Examiner's allegation that claims 2-5 and 34 are directed to an invention that is independent or distinct from the invention originally claimed because claims 2-5 and 34 correspond to Figure 5 while the original claims corresponded to Figure 1 is in error.

The Examiner alleges that claims 2-5 and 34 are directed to an invention that is independent or distinct from the invention originally claimed. (Page 2, lines 1-2 of Item 3 in the Final Office Action mailed on October 2, 2007(hereinafter the "Final Office Action")). Appellants submit, however, that the subject matter of claims 2-5 and 34 are not directed to an invention that is independent or distinct from the invention originally claimed.

The Examiner's allegation is based upon the "fourth flow path" called for in claim 2 and the mistaken belief that this subject matter corresponds to Figure 5 while the original claims corresponded to Figure 1. (Page 2, lines 3-7 of Item 3 in the Final Office Action). Claims 2-5 and 34 have always read upon the embodiment shown in Figure 5 and not the embodiment shown in Figure 1. Specifically, original claim 2, as presented when the application was filed, called for "a forth [sic] flow path operable to supply a third anode reactant feed stream to said third flow path; and a forth [sic] valve in said forth [sic] flow path operable to modulate flow through said forth [sic] flow path." (Claim 2, page 35 of the patent application as filed). This fourth flow path called for in claim 2,

however, is not present in the embodiments shown in Figures 1 or 2. Rather, this fourth flow path is only present in Figure 5.

In particular, Figure 1 discloses a third flow path 52 that extends between the outlets of anode sections 30, 32. Third flow path 52 shown in Figure 1, however, does not communicate with a fourth flow path which is operable to supply a third anode reactant feed stream to the third flow path. Rather, Figure 1 shows a valve 54 that communicates with third flow path 52 to allow anode effluent to be vented therefrom. There is no disclosure in Figure 1 of a flow path communicating with third flow path 52 that is operable to supply a third anode reactant feed stream to third flow path 52. Thus, there is no "fourth flow path" called for in original claim 2 present in Figure 1. Figure 2 is the same as Figure 1 with respect to the "fourth flow path" not being present. Thus, there is no "fourth flow path" called for in original claim 2 present in either Figures 1 or 2.

Rather, the "fourth flow path" called for in claim 2 is only in the embodiment shown in Figure 5. In particular, the embodiment shown in Figure 5 includes a fourth flow path 100 and valve 102 that are used to provide a third anode reactant stream 104 to third flow path 52. (Page 26, paragraph [0045] and Figure 5 of the original patent application). Thus, claim 2 as originally presented when the application was filed corresponded to Figure 5. Original claim 2 never corresponded to Figure 1 because Figure 1 does not disclose the fourth flow path called for in claim 2.

Claims 3-5, as originally presented when the patent application was filed, all depended from claim 2 and, therefore, also always corresponded to Figure 5 and have never corresponded to Figure 1. Additionally, claim 34, which was subsequently added

to the patent application (Amendment filed on October 6, 2006), depends from claim 2 and, as such, has always corresponded to Figure 5 and never to Figure 1 since its presentation. Thus, claims 2-5 and 34 have always corresponded to Figure 5 and not Figure 1. Therefore, these original claims corresponded to Figure 5 and the original claims were not limited to the embodiment of Figure 1.

Additionally, claims 1 and 6-8, as presented when the application was filed, have always corresponded to the embodiments shown in Figures 1, 2 and 5. Claim 9, as presented when the application was filed, has always corresponded to the embodiment shown in Figure 2 and not the embodiments shown in Figures 1 and 5. Claim 10, as presented when the application was filed, has always corresponded to the embodiment shown in Figure 1 and not the embodiments shown in Figures 2 or 5. Thus, original claims 1 and 6-10 corresponded to the embodiments shown in Figures 1, 2 and 5. Therefore, the original claims were not limited to the embodiment of Figure 1 and, rather, were directed to all three embodiments shown in Figures 1, 2 and 5.

Appellants submit that for at least these reasons, the Examiner's allegation that claims 2-5 and 34 are directed to an invention that is independent or distinct from the invention originally claimed because claims 2-5 and 34 correspond to Figure 5 while the original claims corresponded to Figure 1 is in error. Appellants therefore request that the Examiner's holding that claims 2-5 and 34 are withdrawn be REVERSED.

B. The Examiner's holding that claims 2-5 and 34 are withdrawn based on 37 CFR § 1.145 is in error because Appellant has not presented claims that are distinct from the invention originally claimed.

The Examiner alleges that claims 2-5 and 34 are withdrawn from consideration as being directed to a non-elected invention. The Examiner bases this assertion on 37 CFR § 1.145 and the allegation that claims 2-5 and 34 are directed to a non-elected species. (Page 2, lines 8-12 of Item 3 in the Final Office Action). Appellants submit that the Examiner's allegation is in error because the requirements of 37 CFR § 1.145 are not met.

The Applicant can be required to restrict the claims to the invention previously claimed "if, after an Office Action on an application, the Applicant presents claims directed to an invention distinct from and independent of the invention previously claimed." 37 CFR § 1.145. This requirement is further supported in MPEP § 821.03.

Appellant's submit that the original claims 1-10, presented when the patent application was filed, corresponded to the embodiments shown in Figures 1, 2 and 5, for at least the reasons stated above. As such, the inventions shown in Figures 1, 3 and 5 are not "distinct from and independent of the invention previously claimed," as required by 37 CFR § 1.145. Rather, the invention shown in Figures 1, 3 and 5 are the invention previously claimed.

Furthermore, there have been numerous Office Actions on the merits of the pending claims, including claims 2-5 and 34. These claims (original claims 1-10) have undergone numerous examinations on the merits without objection or request for restriction on the part of the Examiner. In particular, Appellants note that on April 25, 2006, a Restriction/Species Requirement was requested wherein the Examiner did not make any assertion that original claims 1-10 call for independent or distinct inventions. (Pages 2-3 of the Office Action dated April 25, 2006). Following a response to that

Election/Restriction Requirement, Appellants have received three subsequent Office Actions (Office Actions with mailing dates of June 6, 2006; January 3, 2007; and April 13, 2007), wherein the Examiner has never raised the issue of claims 2-5 and 34 being directed to an invention distinct from and independent of the invention previously claimed. Rather, the Examiner conducted substantive examinations of these claims (claims 2-5 and 34) along with other pending claims (claims 1 and 6-10). Moreover, Appellants have filed and paid for a Request for Continued Examination in this matter. (Request for Continued Examination filed on March 20, 2007). Again, the Examiner continued to conduct a substantive examination of these claims (claims 2-5 and 34) along with the other pending claims (claims 1 and 6-10). Therefore, there have been multiple Office Actions on the merits of claims 1-10 and 34.

Thus, Appellants submit that claims 2-5 and 34 have always corresponded to Figure 5 and that claims 2-5 and 34 are not directed to an invention distinct from and independent of the invention previously claimed. Rather, claims 2-5 and 34 are directed to an invention that has been claimed since the initial filing of the patent application. Appellants also submit that claims 2-4 and claim 34 have received numerous substantive examinations on the merits along with claims 1 and 5-10 without a Restriction/Election Requirement. Thus, Appellants have not presented claims, after an office action on the merits, directed to an invention distinct from and independent of the invention previously claimed as required by 37 CFR § 1.145. Further, the Examiner has failed to establish that the requirements of 37 CFR § 1.145 have been met.

Therefore, the Examiner's holding that claims 2-5 and 34 are withdrawn cannot be based on 37 CFR § 1.145 and is in error. Appellant's request that the Examiner's holding that claims 2-5 and 34 are withdrawn be REVERSED.

II. Claims 1 and 5-10 comply with 35 USC § 112, second paragraph, because the claims particularly point out and distinctly claim the subject matter which Appellants regard as the invention.

The Examiner alleges that claim 1 and 5-10 do not comply with 35 USC § 112, second paragraph. Appellants submit that claims 1 and 5-10 comply with 35 USC § 112, second paragraph because claims 1 and 5-10 particularly point out and distinctly claim the subject matter which Appellants regard as the invention.

During patent examination, the pending claims must be "given their broadest reasonable interpretation consistent with the specification." *Phillips v AWH Corp.*, 415 F.3d, 1303 (Fed. Cir. 2005) (en banc). Additionally, during examination, the claims must be interpreted as broadly as their terms reasonably allow. *In re American Academy of Science Tech Center*, 367 F.3d 1359, 1369 (Fed. Cir. 2004). The words of the claim must be given their plain meaning unless the plain meaning is inconsistent with the specification. *In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989). "The ordinary and customary meaning of a claim term is a meaning that the term would have to a person of ordinary skill in the art when questioned at the time of the invention, i.e., as of the effective filing date of the patent application." *See, Phillips,* 415 F.3d at 1313. Thus, the terms of claims 1 and 5-10 should be given their the broadest reasonable meaning consistent with the specification and with their ordinary and customary meaning.

A. The term "operational state" as used in claim 1 is definite and particularly points out and distinctly claims the subject matter which Appellants regard as the invention.

The Examiner alleges that the term "operational state" as used in claim 1 is unclear. (Page 3, lines 6-7 of Item 6 of the Final Office Action). Appellants submit that the term "operational state" as used in claim 1 is definite and particularly points out and distinctly claims the subject matter which Appellants regard as the invention.

Claim 1 calls for the "valve not impeding flow communication between said outlets of said first and second anode sections through said third flow path regardless of an operational state of said valve." (emphasis added). The term "operational state" is definite in claim 1 when given its ordinary and customary meaning that the term would have to a person of ordinary skill in the art. In particular, the term "operational state" is modifying the valve called for in claim 1. As such, the term "operational state" refers to the state of the valve, in particular valve 54 in the instant application. Valves are operational to regulate or modulate a fluid flow. This interpretation is consistent with the ordinary and customary meaning of "valve" and with Appellants specification wherein third valve 54 is stated as being operable to modulate the venting of anode effluent (a fluid flow) from fuel cell system 20. (Page 8, lines 5-7 of paragraph [0019]). Furthermore, the specification indicates that valve 54 can be a simple open and closed valve or a proportional valve that is operable to regulate the quantity of anode effluent flowing therethrough and that the operational requirements of valve 54 will vary depending upon how fuel cell system 20 is to be operated. (Page 8, lines 11-14 of paragraph [0019]). Thus, Appellants have provided in the specification that a valve is

operable to modulate or regulate a fluid flow. Furthermore, Appellants have established that the valve can be a simple open-and-closed valve or a proportional valve.

With this understanding of the term "valve," the term "operational state" of a valve is clear to one or ordinary skill in the art. Valves can have various "operational states." For example, when the valve is a simple open-and-closed valve, the valve has two operational states—open and closed. When the valve is a proportional valve, the valve may have a plurality of discrete operational states or an infinite number of operational states between the open and closed states. For example, a proportional valve can restrict or regulate the quantity of fluid flowing therethrough. This regulation can correspond to the valve being 100% open, 0% open (100%closed), or some value/position therebetween. The 100% open position would correspond to allowing a maximum flow therethrough while the 0% open would correspond to allowing no flow therethrough. An intermediate position between 100% open and 0% open would allow some fluid flow therethrough between the maximum flow value and the zero flow value. This capability of valves is well-known to one skilled in the art and is consistent with Appellants' specification.

Thus, when the term "operational state" is read in the context of claim 1, one of ordinary skill in the art would readily understand that the term "operational state" refers to the operational states that a valve is capable of having. Accordingly, the term "operational state" as used in claims 1 and 5-10 is definite and does particularly point out and distinctly claim the subject matter which Appellants regard as the invention. For at least this reason, Appellants request the instant rejection of claims 1 and 5-10 be REVERSED.

B. The Examiner's interpretation of the term "operational state" is in error.

The Examiner has incorrectly limited the interpretation of the "operational state" as used in claim 1 as only corresponding to the valve being open. (Page 3, lines 8-9 of Item 6 in the Final Office Action mailed on October 2, 2007). Appellants submit that such interpretation of the term "operational state" is unduly limited and does not give the claim term its broadest reasonable interpretation consistent with the specification and consistent with the meaning that the term would have to have a person of ordinary skill in the art, as required.

Claim 1 calls for "said valve not impeding flow communication . . . regardless of an operational state of said valve." The language of claim 1 does not limit the operational state of the valve to strictly being to when the valve is open. Rather, claim 1 merely recites an "operational state" and does not limit that operational state to any particular state. As such, the term "operational state" should not be limited to only being when the valve is open.

Additionally, claim 1 indicates that a particular function (not impeding flow communication) does not change regardless of an operational state of the valve. The use of the term "regardless of" is a preposition and should be given its ordinary and customary meaning. "Regardless of" can mean "without taking into account" or "in spite of." These possible meanings are ordinary and customary meanings and are consistent with Appellants' specification. Thus, the "regardless of" term does not limit the "operational state" of the valve to being only an "open" state. Rather, the term "operational state" should be given its broadest reasonable interpretation consistent with

the specification. As such, Appellants submit that "operational state" corresponds to any possible operational state for a valve as known to one skilled in the art and consistent with the specification.

Accordingly, the term "operational state" should be interpreted as corresponding to an open position, a closed position, and any position therebetween. This is consistent with the specification which indicates that valve 54 can be a simple open-and-closed valve or a proportional valve that can regulate the quantity of anode effluent flowing therethrough.

Thus, Appellants respectfully assert that the Examiner's interpretation of the term "operational state" as only corresponding to when the valve is "open" is in error. Appellants request that the term "operational state" be interpreted to include any valve position – fully opened, fully closed and any position therebetween. Such an interpretation gives the term "operational state" its broadest reasonable interpretation consistent with the specification and consistent with the meaning that the term would have to one skilled in the art. Appellants respectfully request that the instant rejection of claims 1 and 5-10 be REVERSED.

III. Claims 1 and 5-9 are not anticipated by the Cheron reference because the Cheron reference fails to disclose first and second devices in the respective first and second flow paths that are operable to modulate the entire flow of the respective first and second anode reactant feed streams through the respective first and second flow paths as called for in claim 1.

A. The Cheron reference does not disclose the first and second flow paths and the first and second devices called for in claims 1 and 5-9.

The Examiner alleges that the Cheron reference anticipates claim 1 and 5-9. Appellants submit, however, that claims 1 and 5-9 are not anticipated by the Cheron reference because the Cheron reference fails to disclose first and second devices in the respective first and second flow paths that are operable to modulate the entire flow of the respective first and second anode reactant feed streams through the respective first and second flow paths as called for in claim 1.

Specifically, claim 1 calls for "a first flow path operable to supply a first anode reactant feed stream to an inlet of a first anode section . . . said first anode reactant feed stream being the only anode reactant feed stream flowing into said first anode section through said first inlet." (emphasis added). Claim 1 also calls for

> a second flow path distinct and separate from said first flow path and operable to supply a second anode reactant feed stream distinct and separate from said first anode reactant feed stream to an inlet of said second anode section . . . said second anode reactant feed stream being the only anode reactant feed stream flowing into said second anode section through said second inlet

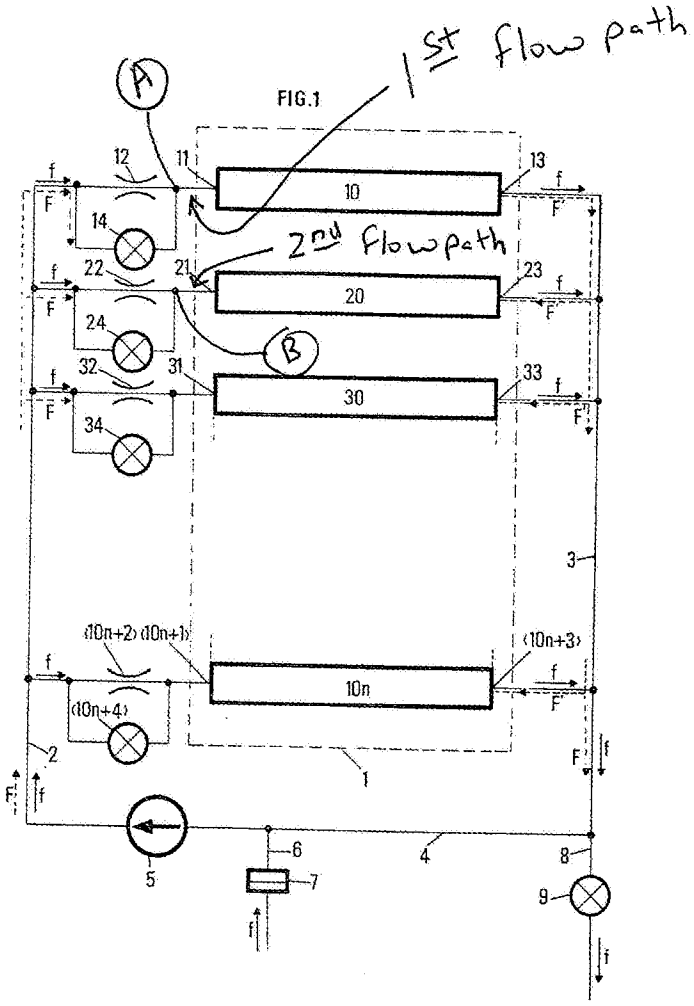
(emphasis added). Thus, only a single anode reactant feed stream flows into each of the first and second anode sections through their respective inlets. Furthermore, these single feed streams flow through respective first and second flow paths. Therefore, the first and second flow paths can only be flow paths having a single feed stream flowing therethrough. Flow paths that can have more than one (i.e., not a single) feed stream flowing therethrough are not the same as the first and second flow paths called for in claim 1.

Looking at the Cheron reference, the only sections of the arrangement disclosed that correspond to the first and second flow paths of claim 1 are the flow paths (not

numbered) that extend (to the left in the Figures 1, 7 and 8) from the inlet (11, 21, 31) of one of the anode sections (10, 20, 30) to the junction of that flow path with two other flow paths. If the flow path were to extend past the junction, such flow path would receive two different feed streams and therefore not be the same as the first and second flow paths called for in claim 1. Appellants have included herein marked-up Figures 1 and 8 from the Cheron reference wherein the only possible first and second flow paths are indicated. As can be seen, the first flow path can only extend between a junction point, indicated as A in the marked-up drawings, to the inlet of anode section (10). Similarly, the second flow path can only correspond to the section that extends from a junction point, indicated as B in the marked-up drawings, to the inlet of second anode section (20).

The flow paths to the left of points A and B cannot be considered equivalent to the first and second flow paths called for in claim 1 because there are two distinct and separate feed streams (through valve and regulator 12, 14 and through valve and regulator 22, 24, respectively) that can flow therethrough and which join together at junction points A, B. As such, if either the first or second flow path were to be considered to extend to the left of junction points A, B, such flow path would carry two separate and distinct flows (one through regulators 12, 22 and the other through valves 14, 24) to the respective anode sections 10, 20. Therefore, the first and second flow paths in the Cheron reference cannot be considered to extend to the left of junction points A, B in the arrangements shown and be the same as the first and second flow paths called for in claim 1.

FIG.1


1st flow path
2nd flow path
A
B
10
20
30
10n
11
12
13
14
21
22
23
24
31
32
33
34
(10n+1)
(10n+2)
(10n+3)
(10n+4)
1
2
3
4
5
6
7
8
9
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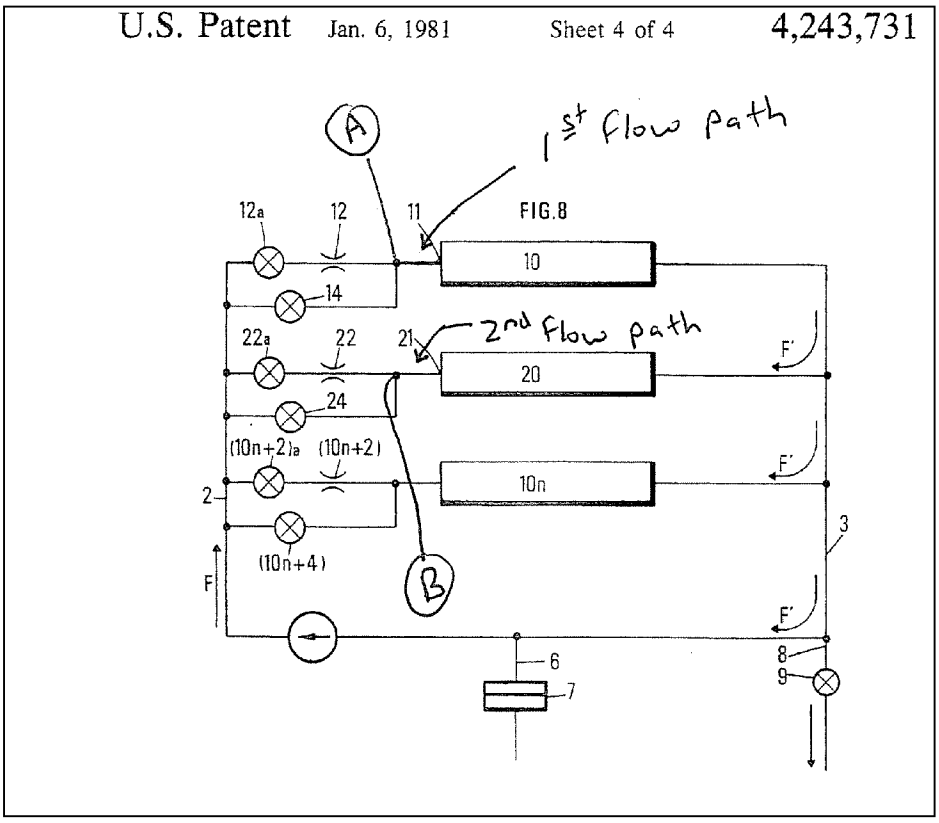

Claim 1 further calls for "a first device in said first flow path operable to modulate an entire flow of said first anode reactant stream through said first flow path." (emphasis added). Claim 1 also calls for "a second device in said second flow path operable to modulate an entire flow of said second anode reactant stream through said second flow path." (emphasis added). The Cheron reference, however, does disclose the first and second devices called for in claim 1. The first and second flow paths in the Cheron reference (the flow paths between points A, B and inlets 11, 21) do not include respective first and second devices that are each operable to modulate an entire flow of the respective first and second anode reactant streams through the respective first and second flow paths. Rather, these flow paths clearly have no device or other obstruction therein that is operable to modulate the entire flow therethrough.

The Cheron reference discloses multiple flow control devices, such as regulators 12, 22 (and valves 12a, 22a for the embodiment of Figure 8) that can regulate flow through that particular flow path and by-pass circuit valves 14, 24 that can regulate flow through the respective by-pass flow paths. (Column 3, lines 24-27 and 51-58 and Figures 1, 7 and 8 of Cheron). Neither of these flow paths, however, corresponds to the first and second flow paths called for in claim 1. Moreover, none of these flow control devices are operable to modulate an entire flow of anode reactant feed streams flowing through the associated anode inlet. Rather, Cheron discloses that each anode inlet can receive a feed stream through either the associated regulating means (12, 22, 32) or through the associated by-pass circuit valves (14, 24, 34). As such, regulating means (12, 22, 32) and by-pass circuit valves (14, 24, 34) can only modulate the flow going therethrough which is not the only feed stream that can flow to the associated anode section (10, 20, 30) through the associated inlet (11, 21, 31).

Appeallants submit that the Cheron reference does not disclose the first and second devices in the respective first and second flow paths which are operable to modulate the entire flow of the respective first and second anode reactant feed streams through the respective first and second flow paths as called in claim 1. Therefore, the Cheron cannot anticipate claim 1. Further, claims 5-9 all depend from claim 1 and for at least this same reason are also not anticipated by the Cheron reference. Accordingly, Appellant request that the instant rejection of claims 1 and 5-9 as being anticipated by the Cheron reference be REVERSED.

B. The Examiner's rejection of claims 1 and 5-9 as being anticipated by the Cheron reference is in error because the Examiner fails to consider the entire teachings of the Cheron reference.

The Examiner alleges that claim 1 is anticipated by the Cheron reference based on by-pass circuit valves (14, 24, 34) all being closed at t_0. (Page 4, lines 8-13 of Item 14 in the Final Office Action). The Examiner's assertion, however, is in error because is fails to consider the teachings of the Cheron reference as a whole.

The Cheron reference discloses the existence of a by-pass circuit in each of the arrangements shown in Figures 1, 7 and 8. Each of these by-pass circuits is connected to the feeding pipe 2 and each includes a by-pass valve (14, 24, 34). The by-pass circuit allows inlets (11, 21, 31) to be directly connected to the feeding circuit 2 avoiding the passage through regulators (12, 22, 32). (Column 3, lines 51-54 and Figures 1, 7 and 8 of Cheron). Thus, the Cheron reference specifically discloses that each inlet (11, 21, 31) is connected to two different flow paths that are each operable to supply anode reactant thereto.

Therefore, regardless of the initial or present operational state of regulators (12, 22, 32) and by-pass valves (12, 24, 32) none of these flow control devices is operable to modulate an entire flow of the anode reactant feed stream through the associated inlet (11, 21, 31). Rather, each of these flow control devices can only modulate its own flow which is not the only feed stream that can flow into the associated inlet (11, 21, 31).

Appellant submits that for at least this additional reason claims 1 and 5-9 are not anticipated by the Cheron reference. Appellant requests that the instant rejection of claim 1 and 5-9 as being anticipated by the Cheron referene be REVERSED.

IV. Claim 10 is patentable because the Examiner has not made a prima facie case of obviousness.

Claim 10 depends from claim 1 which is patentable for at least the reasons stated above. Therefore, for at least these same reasons, Appellants submit that the Examiner has not made a prima facie case of obviousness. Thus, Appellants request that the instant rejection of claim 10 be REVERSED.

Conclusion

The present claims are patentable over the cited art. Appellants, therefore, respectfully petition this Honorable Board to reverse the final rejection of the claims on each ground and to indicate that all claims are allowable.

Respectfully submitted,

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Claim Appendix

Copy of the Claims Appealed

1. A fuel cell system comprising:

at least one cathode section having an inlet and an outlet;

at least two anode sections each having an inlet and an outlet;

wherein said at least one cathode section and said at least two anode sections are operable to convert an oxidant-containing cathode reactant and a hydrogen-containing anode reactant into electricity, a cathode effluent and an anode effluent;

a first flow path operable to supply a first anode reactant feed stream to an inlet of a first anode section of said at least two anode sections, said first anode reactant feed stream being the only anode reactant feed stream flowing into said first anode section through said first inlet;

a second flow path distinct and separate from said first flow path and operable to supply a second anode reactant feed stream distinct and separate from said first anode reactant feed stream to an inlet of a second anode section of said at least two anode sections, said second anode reactant feed stream being the only anode reactant feed stream flowing into said second anode section through said second inlet;

a first device in said first flow path operable to modulate an entire flow of said first anode reactant feed stream through said first flow path;

a second device in said second flow path operable to modulate an entire flow of said second anode reactant feed stream through said second flow path;

a third flow path connecting an outlet of said first anode section to an outlet of said second anode section without passing through an anode section, said third flow path thereby providing flow communication between said first and second anode sections through said outlets; and

a valve communicating with said third flow path and operable to modulate venting of anode effluent from said third flow path, said valve not impeding flow communication between said outlets of said first and second anode sections through said third flow path regardless of an operational state of said valve.

2. A fuel cell system comprising:

at least one cathode section having an inlet and an outlet;

at least two anode sections each having an inlet and an outlet;

wherein said at least one cathode section and said at least two anode sections are operable to convert an oxidant-containing cathode reactant and a hydrogen-containing anode reactant into electricity, a cathode effluent and an anode effluent;

a first flow path operable to supply a first anode reactant feed stream to an inlet of a first anode section of said at least two anode sections;

a second flow path operable to supply a second anode reactant feed stream to an inlet of a second anode section of said at least two anode sections;

a first device in said first flow path operable to modulate flow through said first flow path;

a second device in said second flow path operable to modulate flow through said second flow path;

a third flow path connecting an outlet of said first anode section to an outlet of said second anode section without passing through an anode section, said third flow path thereby providing flow communication between said first and second anode sections through said outlets;

a valve communicating with said third flow path and operable to modulate venting of anode effluent from said third flow path;

a fourth flow path operable to supply a third anode reactant feed stream to said third flow path without said third anode reactant feed stream flowing through an anode section prior to reaching said third flow path; and

a third device in said fourth flow path operable to modulate flow through said fourth flow path.

5. The system of claim 1, wherein said first and second devices are proportional valves that regulate a quantity of said anode feed streams flowing to said respective first and second anode sections.

6. The system of claim 1, wherein said first and second devices are each operable to block flow through said respective first and second flow paths.

7. The system of claim 1, wherein said valve is a proportional valve that regulates a quantity of anode effluent vented from said third flow path.

8. The system of claim 1, wherein said valve is operable to block venting of anode effluent from said third flow path.

9. The system of claim 1, wherein said at least one cathode section is a cathode portion of a single fuel cell stack and said at least two anode sections are an anode portion of said single fuel cell stack.

10. The system of claim 1, wherein said first anode section is an anode portion of a first fuel cell stack and said second anode section is an anode portion of a second fuel cell stack.

34. The fuel cell system of claim 2, wherein said valve does not impede flow communication between said outlets of said first and second anode sections through said third flow path regardless of an operational state of said valve.

Evidence Appendix

Evidence entered by the Examiner and relied on by Appellants

None.

Evidence relied on by Examiner as to grounds of rejection

Cheron (U.S. Patent No. 4,243,731)

Related Proceedings Appendix

None.